placed on the hot plate 107, the substrate is disposed in reduced pressure atmosphere in which up to about 10 Torr is reduced pressure so that the vanish and the polymethyl siloxane film formed based on this vanish is oxidized. In addition, the atmosphere in which the first semiconductor substrate 108 is disposed is filled with gas that essentially consists of H_2 gas having reduction properties. The above H_2 gas cleans the surface of the Cu wire 104, and restrains oxidization of the surface when an electron beam irradiation work described later is carried out.

In this state, the temperature of the hot plate 107 is controlled so that the vanish temperature is held at about 400℃, and a vanish is heated together with the first semiconductor substrate 108. As indicated by an arrow shown in FIG. 4C, the electron beam of about 10 keV in irradiation (acceleration) energy and the irradiation quantity of about 500 $\mu C/cm^2$ is irradiated by the electron beam irradiation device to the vanish.

At this time, a heating state and the electron beam irradiation state are held at about 5 minutes. In this manner, a polymethyl siloxane film is formed on the surface of the silicon nitride film 105, in other words, on the first semiconductor substrate 108.

As has been described above, while heating process is applied to a vanish only in the step 4 that is a

final step of the step 2 to 4, and the vanish is irradiated with the electron beam.

The reason is to prevent from forming an interlayer insulation film with its low dielectric rate having undesirable characteristics caused by a modification of components other than polymethyl siloxane such as solvent contained in a vanish. The modification occurs by irradiating the vanish that is not fixed on the silicon nitride film 105 with the electron beam.

That is, this is because a polymethyl siloxane film is obtained as an interlayer insulation film 106 with its low dielectric rate having desired characteristics.

According to experiments carried out by the inventor s, when a vanish is irradiated with the electron beam in the step 4, a heating process is carried out so that the vanish temperature is substantially constant within the range of 200℃ or more and not more than 500℃, preferably within the range of about 380℃ to 400℃, especially about 400℃, thereby clearly making it possible for the semiconductor device 109 to form a quality polymethyl siloxane film capable of having practically proper operating performance.

In addition, according to experiments made by the inventors, the irradiation dose of the electron beam irradiated to the vanish in the step 4 is set so that a

substantially constant value is obtained at the total irradiation quantity about 500 $\mu C/cm^2$ or more, especially about 500 $\mu C/cm^2$ and the electron beam irradiation is carried out, thereby clearly making it possible to form a good quality polymethyl siloxane film such that the semiconductor device 109 can provide proper operating performance practically.

Similarly, according to experiments made by the inventors, in the step 4, acceleration energy is set so as to obtain a substantially constant value within the range of about 1 keV to 15 keV, preferable about 10 keV and a vanish is irradiated with the electron beam, thereby clearly making it possible to form a good quality polymethyl siloxane film in which the semiconductor device 109 can provide proper operating performance practically.

Furthermore according to experiments made by the inventors, when the electron beam is irradiated while a heating process is applied to a vanish in the step 4, the vanish is disposed in the reduced pressure atmosphere within a predetermined range in a gas having its predetermined reduction properties, thereby clearly making it possible to form a good quality polymethyl siloxane film in which the semiconductor device 109 can provide proper operating performance practically.

In particular, in the above H_2 gas, the vanish is disposed in the atmosphere when a pressure reducing